

JB

**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

JB/T 10506-2005

**Internal combustion engines - Charge air coolers - Technical
requirements**

内燃机 增压空气冷却器 技术条件

(English Translation)

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1 Scope

This standard specifies the technical requirements, test methods, and inspection rules of charge air coolers for internal combustion engines.

This standard is applicable to charge air coolers of internal combustion engine (hereinafter referred to as intercoolers) used in automobiles, tractors and construction machineries. It may also be used as reference for the charge air coolers of internal combustion engine of other purposes.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this standard. For dated reference, subsequent amendments to (excluding any corrigendum), or revisions of, any of these publications do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. For undated references, the latest edition applies.

GB/T 2828.1 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection (GB/T 2828.1-2003, ISO 2859-1: 1999, IDT)

GB/T 3821 Small and medium power internal combustion engines - Cleanliness limits and

measurements

JB/T 10408-2004 Internal combustion engines - Test method for reliability of exchangers

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1 front area

Sz the area of the windward side of the intercooler core with the cooling medium as air, m²

3.2 heat exchange efficiency

eta the ratio of the actual heat exchange amount of the intercooler to the maximum possible heat exchange amount under the same conditions

$\eta = (T_{h,in} - T_{h,out}) / (T_{h,in} - T_{c,in})$ (1) where,

$T_{h,in}$ - - the charge air inflow temperature, °C

$T_{h,out}$ - - the charge air outflow temperature, °C

$T_{c,in}$ - - the cooling medium inflow temperature, °C

3.3 hot side

the surface of the intercooler in contact with the charge air

3.4 cold side

the surface of the intercooler in contact with the cooling medium (cooling water or air)

3.5 water cooling type

a type of intercooler that uses water as the cooling medium

3.6 air cooling type

a type of intercooler that uses air as the cooling medium

3.7 conversion trans-heat

Φ_i the trans-heat when the difference between the charge air inflow temperature and the cooling medium inflow temperature is the set value converted from the actual trans-heat of the charge air under the test condition, kW

$\Phi_i = \Phi_{in} \cdot \Delta t / (t_{h,in} - t_{c,in})$ (2) where,

Φ_{in} - - the actual trans-heat of charge air, kW;

deltat - - the difference between charge air inflow temperature and cooling medium inflow temperature, °C;

th,in - - - - the measured value of charge air inflow temperature, °C;

tc,in - - the measured value of cooling medium inflow temperature, °C.

3.8 pressure drop

deltap the pressure drop caused by overcoming the flow resistance when the medium passes through the intercooler under the test conditions, which expressed by the static pressure difference between the inlet and outlet of the medium, Pa or kPa

3.9 standard air

dry air with a density of 1.204 kg/m³ under the condition with the temperature of 21 °C and the pressure of 101.3 kPa.

3.10 accuracy

the ability of an instrument to indicate or record a measured truth value, expressed by the difference between the indicated value and the truth value

3.11 precision

under the same conditions and repeated measurements of the same physical quantity using the same method, the degree that the obtained indication values are close to the same

4.1 General rules

The product shall be manufactured according to the product drawings and technical documents approved by the prescribed procedures, and shall comply with the provisions of this standard.

4.2 Airtightness

The hot side of the intercooler shall be sealed, and shall be free of leakage under air pressure test of not less than 350 kPa for 1 min.

The water side of the intercooler shall be sealed, and shall be free of leakage under air pressure test of not less than 350 kPa for 1 min.

4.3 Trans-heat

The trans-heat of the intercooler shall meet the requirements of the product drawings or supply agreement.

4.4 Pressure drop

The pressure drop of medium flowing through the intercooler shall meet the requirements of product drawings or supply agreement.

4.5.1

If the charge air inlet temperature is $160\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, the inlet absolute pressure is 200 kPa, the resistance loss is 10 kPa, the cooling air inlet temperature is $\leq 50\text{ }^{\circ}\text{C}$, and the cooling air resistance loss is 200 Pa, the heat exchange efficiency of air cooling type intercooler shall be ≥ 0.82 .

4.5.2

If the charge air inlet temperature is $160\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, the inlet absolute pressure is 200 kPa, If the resistance loss is 10 kPa, the cooling water inlet temperature is $70\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$, and the cooling water resistance loss is 30 kPa, the heat exchange efficiency of water cooling type intercooler shall be ≥ 0.85 .